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WILDLIFE TECHNOLOGY

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The livest, the most widespread, and perhaps the most socially significant activity in the field of American biology today is the technology known as wildlife management. This technology derives its importance not from the logic of present conditions alone but also from belated recognition by the American people of the profligacy with which they have squandered their wildlife heritage. Originally unsurpassed by that of any other continent, American wildlife has been slaughtered and deprived of essential range until certain species have been exterminated and many others dangerously reduced in numbers.

The famed wild or passenger pigeon, once present in what were considered inexhaustible myriads, is now only a memory. The buffalo, once existing in herds so filling the plains that they were never out of sight of pioneers on the march, day after day, for weeks on end, exists now only in Parks and on special reservations. Wildfowl once covered the waters, as pigeons filled the air, but in many areas they no longer appear and in all they have but a fraction of their former abundance. These are merely symbolic cases; all wildlife has suffered in the same way, if not to the same extent.

At last, and in some cases, as we know, too late, in others we hope, in time, the American people have realized that provision must be made for wildlife if it is to continue to exist. Such provision must include not merely better protection, but adequate allotment of lands on which wildlife may find refuge and safety for rearing its young, and finally intelligent and sympathetic management, so that all facilities that can be devoted to wildlife shall have the greatest possible effect. A brighter day for wildlife seems to have dawned, and wildlife management already has a well-defined part in such new national cares as land-planning, rural resettlement, and erosion control, as well as in the revitalized general conservation movement.

ORIGIN AND PRESENT STATUS OF WILDLIFE TECHNOLOGY

Wildlife technology had its origin in the search for better methods of game restoration on private estates, has been contributed to by most of the

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NOTE.--This leaflet supersedes Wildlife Leaflet BS-161 issued by the Bureau of Biological Survey in May 1940.

State conservation departments, and now is a major function of four Federal agencies--the Forest Service, Soil Conservation Service, the Tennessee Valley Authority and the Fish and Wildlife Service.

Of all these, the Fish and Wildlife Service is most extensively occupied with wildlife management, and in retrospect it seems that throughout its history of nearly three quarters of a century the Service has been developing techniques that now prove to be essential in wildlife technology. This development was, in its earlier stages, entirely without reference to wildlife management, a practice then scarcely imagined. In later years the tie between scientific method and practical application has been much closer and the varied techniques fit into the technology like parts of a well-built machine.

IDENTITY, RANGE, AND MIGRATION TECHNIQUES

Among these techniques, those of classifying animals, working out their ranges, and tracing their movements were prominent in early activities of the Bureau of Biological Survey, now a part of the Fish and Wildlife Service, and are still continued. The Service has sent exploring expeditions to almost every part of the Republic and of other parts of North America, including Canada, Mexico, Guatamala, Panama, and our Territorial possessions. It has accumulated representative and extensive collections essential to sound classification, and it has trained competent taxonomists. Although not confined to the Service, work along these lines has been carried on more intensively there than elsewhere, and the Fish and Wildlife Service is recognized as the principal focus of such information relative to the fauna of North America.

The classification of animals is basic to all further study. Its most practical result is a dependable system of names, which enables workers to learn what has been recorded about any particular species and to compare notes effectively with other investigators. The wildlife technician must accurately know what forms he is dealing with; identification is the key to all that is known of relationships, distribution, and habits, and it enables him to shape his practice in the light of knowledge that all investigators, everywhere, have accumulated truly an inestimable advantage.

Throughout its history the Fish and Wildlife Service has been aiding workers by making these critical identifications; it has further collected information on the geographic distribution of animals and intensively studied bird migration. In the course of the migration work, millions of records from all sources have been assembled, providing a more satisfactory basis for generalizations than has ever been available elsewhere. The technique of bird-banding has been adopted, improved, and extended. Its peculiar importance arises from the tracing of the movements of individual birds, thus making possible, in the long run, more accurate definition than has ever before been possible, of migration routes, general bird flyways, and winter and summer ranges of species. The scientific data bearing on the ranges and movements of birds are indispensable to proper conduct of wildlife management problems involving more than a single State,

hence play a leading part in those highly important activities that only the Federal Government can conduct. Among these are the promulgation of regulations protecting birds migrating between the United States and Canada and Mexico, an annual task since 1918, and the establishment of a system of migratory bird refuges giving adequate protection to wild fowl on the breeding and wintering grounds and throughout the major flyways of the United States.

FOOD AND COVER TECHNIQUES

Coexistent with study of the identity, distribution, and migration of animals from the inception of the Fish and Wildlife Service, was research into their food habits. From this technique have developed, partly because of actual relationship, and partly through accidents of administrative history, a number of other techniques for the improvement of environment and for the encouragement of desirable and the control of undesirable species, which are today the very warp and woof of the wildlife manager's art.

Originally developed to throw light on economic values in relation to agriculture, horticulture, and forestry, this work soon responded to the needs of wildlife management, although that term was then unknown. A comprehensive report on the food habits of the bobwhite was published in the Yearbook of the Department of Agriculture for 1903. This was revised in bulletin form and accompanied by accounts of 6 other species of quail in 1905, and in the same year a similar bulletin treating 12 species of grouse and the wild turkey was issued. Systematic research on the food habits of wild fowl was begun in the laboratory in 1905 and in the field in 1908. The first publication on wild-duck food plants appeared in 1911, and it has been succeeded by a number of papers on that subject.

The technique of food-habits research involves laboratory analysis of the contents of the alimentary canals of collected specimens, of feces and regurgitated pellets, of food remains at dens, nests, and roosts, as well as all practicable field investigations of feeding habits and of the utilization of food supplies. Such studies yield data, not only on specific food habits but also on the local, seasonal, and general value of food items, that are of fundamental utility in wildlife management.

Knowledge of the relative importance of the various constituents of wildlife subsistence naturally led to efforts to increase the more valuable kinds. These efforts developed in one direction into recommendations as to choice of kinds, as to care of propagating material, and as to where, when, and how to set out valuable wild-duck food plants. Later, plants affording refuge shelter and nesting cover were included, and the technique, in effect, became one of general improvement of the environment of wild fowl. These recommendations were acted upon extensively through a long series of years and resulted in great improvement of some properties (up to a tenfold increase by the financial scale), and are now serving as the basis of development and improvement of the vast new system of national wildlife refuges (more than 200, totaling more than 3,200,000 acres, primarily for waterfowl, within the limits of the 48 States.) Recommendations as to the value of marsh and aquatic plants and as to methods of propagating them have been of value also to a branch of the fur industry, namely muskrat farming. The demand for these plants, largely

created by publications of the Fish and Wildlife Service based on food-habits research, is the mainstay of a business of supplying propagating material that at times has attained considerable volume.

In another direction data provided by the technique of food-habits research made possible the preparation of a long series of publications on methods of attracting birds. These were intended primarily for people desiring to increase the number of birds about their homes - an esthetic consideration, but certainly of social importance, as it contributes to the enjoyment of life of probably half of the families in the United States. The attracting bird bulletins and leaflets dealt largely with fruits, the increase of which would be helpful, but gave some attention to plants producing relished seeds and to artificial feeding. From the former beginning there was developed a publication on plants valuable for wildlife utilization and erosion control, which treats the whole gamut of wildlife plant utilities including cover, browse, herbage, mast, fruit, and seed. This presentation placed at the disposal of the wildlife manager basic information of a type essential to the success of his work, but not heretofore available. The artificial feeding suggestions were expanded into a publication on winter feeding of wildlife and about all threads of environmental amelioration have been covered in other wildlife publications.

In the actual practice of wildlife technology, the environmental improvement technique has developed into the covey-unit system of quail management. This concept, taking into account also territorial requirements of the birds, aims at the creation, by alteration of the environment, of additional "territories" each having facilities for the year-round support of a covey. Putting the system into effect for a few years has in some instances, produced a larger number of coveys than had previously been seen for 40 or 50 years. Intelligent application of the covey unit of range system seems essentially to have solved the problem of quail management, and the principles involved obviously have a place in the management of all relatively sedentary forms of wildlife. Such species are the objectives of most upland wildlife management, applied on farms, and on private and public shooting preserves, procedure of financial and recreational interest to all farmers and sportsmen concerned, and therefore of distinct social value.

The technique of food-habits research necessarily deals with injurious as well as useful feeding habits of wildlife and thus has led to study of material damage done to crops and other property and of methods of preventing or controlling it. From this beginning developed all the control practices that have been perfected in the Fish and Wildlife Service, for years a major activity of the Service. The wildlife manager, from time to time, has need for information on control procedure, and it is ready made for his use in any emergency.

WILDLIFE TECHNOLOGY IN CONSERVATION

The technology of wildlife management pervades the whole field of wildlife conservation. It is as necessary to success in pure conservation as in management for use. Wildlife refuges, for instance, cannot serve their highest usefulness if merely established and forgotten. Without attention they

may readily change into something quite different from what was planned. Unless there is pruning and thinning, trees and shrubs will "take the place," thus changing conditions vital for wildlife occupation. Animal populations will fluctuate, and without attention to these changes in numbers and the resultant effects upon the carrying capacity of a terrain and the interrelations of organisms, the area may turn out to be anything but a haven of safety for the animals it was intended to benefit. New techniques in land management include intelligent use of fire, water stabilization, pest plant control, and changes in crop production practices to prevent wildlife conflicts with agriculture.

The relations between wildlife and its habitat are dynamic, and where the production of annual crops of wildlife, particularly production for profit, is the object, unremitting attention to the balance between environmental factors, in a word the thoroughgoing application of wildlife technology, is essential to success. Conservation in any degree can best be accomplished by due attention to dynamic ecology. To the forester, the soil conservator, and the land utilization specialist, wildlife production is an incidental but potentially important activity, while to the game manager it is the prime objective. All classes of owners of land upon which wildlife may be conserved for its own sake or managed for utilization, whether Nation or State, association or individual, farmer or sportsman, have need for, and may profit from, the technology of wildlife management.

A technology so universal in application necessarily has great social significance. It offers the only hope of settling the vexed question of farmer-sportsman relationships, upon which depends entirely the possibility of widespread realization of income from the wildlife crop of the land. Development of a satisfactory system of managing and marketing farm game might be the means of transforming many a marginal farm into a productive one. Wildlife technology will help solve problems in land-planning and soil conservation, the prompt and correct solution of which is essential to national prosperity. It points the way to diversification of forest use that may yield income based on wildlife production from timbered areas, which although properly and necessarily preserved by the Nation, may return little, except at long intervals, from tree products alone. The proper functioning of every bird refuge and game preserve, of the system of wildlife protection in the national parks, and of animal conservation in general depends upon wildlife technology. That puts a great burden upon this comparatively young applied science, but it is gratifying that its capacity to bear appears to be in proportion to the load. As closely as wise utilization may be related to material advantage, so the preservation of our wildlife in as great measure as conditions will permit, is essential to the esthetic and spiritual welfare of the Nation.

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